

What is claimed is:

1. An image generating method for rendering a three-dimensional object viewed from a predetermined viewpoint by generating an image of the three-dimensional object and writing color information on the image generated in a rendering buffer, the method comprising:

operating a normal line to a surface of the three-dimensional object;

setting a plurality of sampling points within a rendering region for the three-dimensional object, the rendering region on which the three-dimensional object is projected on the basis of the predetermined viewpoint; and

rendering the three-dimensional object by performing processing for determining an arrangement angle of a predetermined brush image on the basis of the normal line operated at a position on the surface of the three-dimensional object, the position corresponding to each of the plurality of sampling points, and arranging the predetermined brush image at the arrangement angle determined at the position corresponding to each of the plurality of sampling points in the rendering buffer.

2. The image generating method as claimed in claim 1, wherein the operating a normal line to a surface of the three-dimensional object includes operating the normal line to the surface of the three-dimensional object by providing

a first light source for emitting light rays in a first direction crossing at a right angle with an eyes line direction of the predetermined viewpoint and a second light source for emitting light rays in a second direction crossing at a right angle with the eyes line direction of the predetermined viewpoint, irradiating the light rays emitted from the first light source and the light rays emitted from the second light source to the three-dimensional object, executing predetermined rendering processing on the basis of the predetermined viewpoint, and generating a normal image expressing the normal line to the surface of the three-dimensional object in color information,

the setting a plurality of sampling points includes setting the plurality of sampling points in the normal image generated, and

the rendering the three-dimensional object includes rendering the three-dimensional object by performing the processing for determining the arrangement angle of the predetermined brush image on the basis of the color information of each of the plurality of sampling points, and arranging the predetermined brush image at the arrangement angle determined at the position corresponding to each of the plurality of sampling points in the rendering buffer.

3. The image generating method as claimed in claim 2, wherein the rendering buffer is formed so as to store RGB values for every pixel,

the generating a normal image includes generating the normal image by setting a light ray color of the first light source to be a first color of RGB and a light ray color of the second light source to be a second color of the RGB other than the first color, executing the predetermined rendering processing, and operating the RGB values of each of pixels of the surface of the three-dimensional object, and

the determining the arrangement angle of the predetermined brush image includes determining the arrangement angle of the predetermined brush image at each of the plurality of sampling points by operating a direction corresponding to the normal line of each of the plurality of sampling points, on the basis of a value of the light ray color of the first light source and a value of the light ray color of the second light source of the RGB values of the normal image.

4. The image generating method as claimed in claim 2, further comprising setting a light source in an object space in which the three-dimensional object is provided,

wherein the determining the arrangement angle of the predetermined brush image includes determining the

arrangement angle of the predetermined brush image by synthesizing a light ray direction of the light source set with a direction of the normal line operated.

5. The image generating method as claimed in claim 2, further comprising operating a direction from a predetermined position of the normal image generated to each of the plurality of sampling points,

wherein the determining the arrangement angle of the predetermined brush image includes determining the arrangement angle of the predetermined brush image by synthesizing the direction operated with a direction determined on the basis of the color information of the normal image.

6. The image generating method as claimed in claim 4, further comprising operating a direction from a predetermined position of the normal image generated to each of the plurality of sampling points,

wherein the determining the arrangement angle of the predetermined brush image includes determining the arrangement angle of the predetermined brush image by synthesizing the light ray direction of the light source set and the direction operated with angle information determined on the basis of the color information of the normal image.

7. The image generating method as claimed in claim 1, further comprising:

setting a light source in an object space in which the three-dimensional object is provided; and

calculating shadow information of the three-dimensional object by executing predetermined rendering processing based on the predetermined viewpoint and the light source set,

wherein the setting a plurality of sampling points includes setting the plurality of sampling points on the basis of the shadow information calculated.

8. The image generating method as claimed in claim 7, wherein the setting a plurality of sampling points includes setting the plurality of sampling points on the basis of the shadow information so that density of sampling points in a low brightness part is higher than density of sampling points in a high brightness part.

9. The image generating method as claimed in claim 7, wherein the rendering the three-dimensional object includes changing brightness information on the predetermined brush image on the basis of the shadow information calculated.

10. The image generating method as claimed in claim

1, wherein the performing the processing for arranging the predetermined brush image includes performing the processing for arranging the predetermined brush image by writing predetermined color information having brightness adjusted on the basis of brightness information on the predetermined brush image in the rendering buffer.

11. The image generating method as claimed in claim 1, wherein the performing the processing for arranging the predetermined brush image includes performing the processing for arranging the predetermined brush image by writing color information on the surface of the three-dimensional object corresponding to each of the plurality of sampling points, the color information having brightness adjusted on the basis of brightness information on the predetermined brush image in the rendering buffer.

12. The image generating method as claimed in claim 1, wherein the setting a plurality of sampling points includes changing a number of sampling points according to a distance between the predetermined viewpoint and the three-dimensional object.

13. The image generating method as claimed in claim 1, further comprising changing a size of the predetermined brush image according to a distance between the

predetermined viewpoint and the three-dimensional object,
wherein the rendering the three-dimensional object
includes rendering the three-dimensional object on the
basis of the predetermined brush image having the size
changed.

14. The image generating method as claimed in claim
1, further comprising:

storing information on a plurality of brush images;
and

selecting any one brush image of the plurality of
brush images according to a predetermined condition,

wherein the rendering the three-dimensional object
includes rendering the three-dimensional object on the
basis of the any one brush image selected.

15. The image generating method as claimed in claim
1, wherein the arranging the predetermined brush image
includes arranging a predetermined number of brush images
so that a part of the predetermined number of brush images
is placed on one another in a predetermined direction from
the position at which the predetermined brush image is
arranged when arranging the predetermined brush image.

16. The image generating method as claimed in claim
15, wherein the arranging the predetermined brush image

includes arranging a predetermined number of brush images so that a part of the predetermined number of brush images is placed on one another in a predetermined direction based on the arrangement angle of the predetermined brush image when arranging the predetermined brush image.

17. The image generating method as claimed in claim 1, wherein the setting a plurality of sampling points includes shifting positions of the plurality of sampling points set as time passes, and

the rendering the three-dimensional object includes rendering the three-dimensional object on the basis of the positions shifted of the plurality of sampling points.

18. The image generating method as claimed in claim 1, wherein the rendering the three-dimensional object includes rendering the three-dimensional object by shifting the arrangement angle of the predetermined brush image arranged as time passes.

19. A storage medium having information recorded thereon, when the information is loaded onto an operating apparatus, the information making the operating apparatus execute the method as claimed in claim 1.

20. An image generating apparatus for rendering a

three-dimensional object viewed from a predetermined viewpoint by generating an image of the three-dimensional object and writing color information on the image generated in a rendering buffer, the apparatus comprising:

a normal line operation section for operating a normal line to a surface of the three-dimensional object;

a sampling point setting section for setting a plurality of sampling points within a rendering region for the three-dimensional object, the rendering region on which the three-dimensional object is projected on the basis of the predetermined viewpoint; and

a rendering section for rendering the three-dimensional object by performing processing for determining an arrangement angle of a predetermined brush image on the basis of the normal line operated by the normal line operation section at a position on the surface of the three-dimensional object, the position corresponding to each of the plurality of sampling points, and arranging the predetermined brush image at the arrangement angle determined at the position corresponding to each of the plurality of sampling points in the rendering buffer.

21. A data signal embodied in a carrier wave, comprising information used for executing the method as claimed in claim 1.

22. A program, when the program is loaded onto an operating apparatus, the program making the operating apparatus execute the method as claimed in claim 1.